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ABSTRACT

This report presents an overview of the energy management plan for Tasmanian schools designed to minimize the costs of all forms of energy usage within these facilities. The policy and objectives of the plan are provided along with details of the plan itself and its current status. Appendices contain an extract from Asset Management Plan for Real Property Assets, a template for writing the Project Definition Statement for Energy Management, a list of sites identified for listing on the energy management program for 1997/98, and a draft of an energy audit discussion document. (GR)

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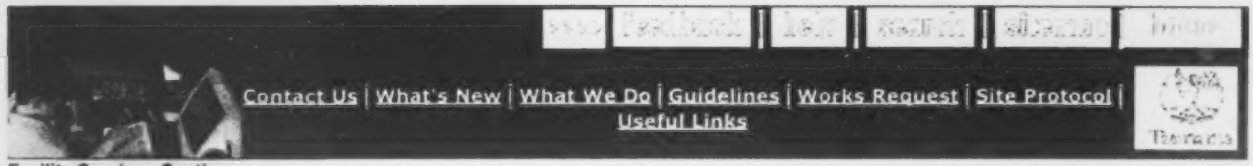

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Facility Services Section
Department of Education

Energy Management Plan

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Facility Services Section
Department of Education

Energy Management Plan

1. OVERVIEW

The Department of Education has been pro-active and innovative in energy management activities since prior to 1990.

It was apparent by that time that the impact of the growth in relative terms of the total amount of expenditure per annum for energy by DoE could be significantly reduced if some attention was focussed on this issue. This period corresponded firstly with changes in the national financial climate which required the reduction in real terms of Government, and hence Agency budget bottom lines and the consequential need to achieve Agency outcomes more cost effectively. Secondly, it followed impetus given to energy management matters within Government which had been generated by the Government Energy Management Scheme (GEMP) initiative. This scheme, which eventually became inactive, was administered by the Energy Management Centre attached to the Hydro-Electric Commission (later to become the Integrated Energy Management Centre which gained its own charter and operated independently of the Hydro Electric Commission).

With input from DoE Facility Services staff, and assistance from the IEMC and others, a School's Energy Efficiency Scheme was developed and then implemented in 1990. A standard reporting procedure was devised and adopted for reporting relevant details for inclusion in the basic energy audits which began to be progressively undertaken for, firstly, schools throughout the State, and which was later extended to other DoE facilities such as libraries and hostels. These audits, which analysed energy use within each facility to allow derivation of a facility energy signature and other statistics, also identified measures which could be undertaken to reduce energy costs and consumption, and quantified the cost of each energy saving measure and the amount of the projected savings which would result from the implementation of each measure. The audits and audit process have been progressively refined as experience has been gained and to date basic audits for most facilities have been completed.

The initial energy audits were concentrated on facilities with the largest energy consumption per unit of floor area so that the largest potential savings could be identified early in the audit program. Each audit identified measures which could be taken to reduce energy consumption. Those items which were passive in nature, being mainly strategies which could be readily adopted by the facility occupants or operators to reduce energy consumption, and which could be implemented at nil or minimal cost, have either been undertaken directly, or the relevant facility advised of the actions which should be undertaken so as to reduce energy consumption. Examples of these actions are:-

- the re-setting of time clocks to reduce operating hours of heating and other energy consuming devices where possible;
- turning off lights, radiators, and other devices when they are not needed;

- replacement of low efficiency fluorescent light tubes with those of greater efficiency as the opportunity arose;
- reduction of lighting levels in non-critical areas; and
- checking the operation of thermostats to ensure spaces are not overheated.

A parallel program of undertaking those items which required active involvement and involved a cost has also been implemented as funds have permitted. Items with the shortest simple payback period, and hence most cost effective, were generally given preference, and during the period from 1990 a number of projects which have been undertaken to give increased energy efficiency in several facilities, have been completed.

An education program has been implemented which runs in parallel with the energy monitoring and audit program. Schools have been visited by staff and others to explain the Energy Efficiency Scheme, the reasons for its implementation, and to give background information related to energy efficiency and conservation generally. Various funds have been available from the Commonwealth Department of Primary Industry and Energy to support energy conservation related education activities and these have been applied to the provision of resource materials and the cost of school group visits to the Integrated Energy Management Centre to gain a practical insight into energy conservation matters.

The result has been that the energy consumption across the Agency has reduced from 74.5 GwH in the base year of 1990, to 65.2 Gwh in 1994, and has stayed at about that level subsequently. This is resulting in an ongoing reduction of energy of about 12.5% per year over the 1990 figure. Because of the upward trend in tariffs, this reduction in energy has not resulted in a commensurate percentage reduction in the annual cost of energy, which has dropped from $8.6M in 1990 to $7.8M in 1996. Cumulative savings to DoE in energy terms in the six years from 1990 (viz 1991-96) have been approximately 45 GwH.

The immediate aim of DoE is to continue to maintain ongoing control over the collective Agency energy use, to continually review energy usage, and to adopt improved practices, principles and methodologies when appropriate or able to do so.

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Facility Services Section
Department of Education

Energy Management Plan

2. POLICY

The Department of Education is committed to the minimisation of the costs of all forms of energy usage within all its facilities.

This is expressed the following statements in the Strategic Plan:-

- Section 25.3.1 - (1995) Prepare a business plan that identifies energy management projects with "payback" periods of less that three years.
- Section 25.4.5 - (Ongoing) Pursue energy management options including installation of systems that guarantee real savings in the short term. Educate staff in relation to energy use. Audit energy use at sites. Apply best energy conservation practices in the design of new and rehabilitated buildings.

It is also reflected in Strategy 15 of the Agency's Asset Management Plan for Real Property Assets (which is shown at Appendix 'A').

This commitment is supported by the following working criteria:-

- That the reduction in energy costs for heating and air conditioning will not compromise the maintaining of acceptable levels of comfort in occupied spaces, compliance with Occupational Health and Safety requirements, or other related matters of public safety.
- Lights, heating, computers, and energy consuming appliances generally are to be switched off at the end of the working day and where possible during extended periods of non-use during the working day.
- Heating controls are to be set to maintain a temperature of no greater than 22°C and cooling controls are to be set to maintain a temperature no less than 25°C.
- Where heating/cooling plant start-up optimisation or outdoor compensation is installed at a facility, then the plant's start time should be set so that the required space temperature is achieved 30 minutes after occupancy time with the proviso that the latest start time of the plant is the time of occupancy.
- Energy use and its efficiency will be considered in the life cycle costing of new buildings and those that are subject to major rehabilitation during the planning stages of these projects.
- Purchase of equipment having the most cost effective energy use characteristic is preferred where otherwise functionally identical equipment is available at similar cost.
- The heating of buildings for the benefit of non core users (such as trade staff and cleaners) is to be minimised, or the hours of duty of those users is to be adjusted where possible so that they correspond to the greatest extent with those of the core users.

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- Replacement of existing energy inefficient equipment with equipment of greater energy efficiency where this is cost effective in the short term and funds are available.
- Use that form of energy for particular circumstances which will give the greatest life cycle cost effectiveness.
- Designation of the Manager (Facility Services) as the member of DoE who is responsible for the overall monitoring and direction of the Agency's Energy Management Plan.
- The nomination of one member of staff in each facility who will be responsible for monitoring energy use in that facility on a day to day basis and ensure that the relevant components of the Energy Management Plan which apply to that facility are undertaken properly and in a timely manner.
- Optimise the use of space within facilities so that heating demand during periods of highest heating requirement (ie winter) is minimised.
- Continually review types of energy available, their relative prices and tariffs, and to change suppliers and energy types if this is cost-effective in the short term.

The latest revision of the "School Management Handbook" also includes a section related to Energy Management, and a sub-section within the section on Devolved Resources which relates to the allocation of funds to schools to cover the payments they make for the costs of the energy consumed. This sub-section includes details of the method of calculating the financial incentive which is available to schools should they make a reduction in their annual energy costs through good energy housekeeping or other means. It does mean that schools can commit expenditure of some of their budget to energy saving initiatives knowing that they will get a financial benefit from doing so.

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Facility Services Section
Department of Education

Energy Management Plan

3. OBJECTIVES

The first objective of the Energy Management Plan is to put in place strategies that will minimise the expenditure of Agency funds on the costs of energy.

As a secondary measure, and as a flow on from the first, it is hoped that the level of general awareness of energy conservation which is raised as a broader issue, particularly in schools, will result in changes for the better to the general community attitudes regarding the sometimes profligate use of energy.

The objectives will be met by the undertaking the following initiatives:-

- Education of all staff regarding the need to, and the reasons for, the necessity to reduce costs of energy use and to then keep them to a minimum in the future, and the methodologies which can be used to achieve this.
- Designate staff with the appropriate skills and/or engage consultants as appropriate to advise facility managers and others of appropriate courses of action which can be taken in relation to energy conservation matters, and to plan and conduct education and awareness programs as considered necessary.
- Use established intra-Agency documents and publications to communicate current practices and thinking with respect to energy conservation practices.
- To have a financial incentive available to facilities to encourage them to undertake and finance from facility funds some of those works and other measures which will result in the minimisation of energy use.
- Support an extension program of school student education regarding energy and its conservation, and the formation of a related 'partnership' program in schools which involves students and an 'adviser' in setting and monitoring energy use objectives.
- Implement a strategy whereby facilities monitor their energy usage on a frequent (weekly) basis and are encouraged to experiment with procedures and practices which reduce energy consumption and adopt those which are successful.
- Continue to centrally monitor the energy consumption at all Agency facilities to establish trends and as an aid to identifying future courses of action.
- Continue to undertake the regular medium level energy auditing of facilities on a cyclic basis and high level auditing of high energy use facilities on a needs basis as funds permit.
- Produce reports on an ad hoc, regular and annual basis.
- Include projects specifically designed to reduce energy consumption in minor and essential maintenance works programs as funds permit or within a special purpose program covering energy conservation projects.
- Make energy conservation an issue in the performance of contractors who maintain DoE engineering assets, particularly heating and air conditioning systems.

It is the intention that the outcome resulting from the implementation of the various programs and strategies is that energy use, and hence costs are minimised without the service delivery requirements of the Agency being compromised.

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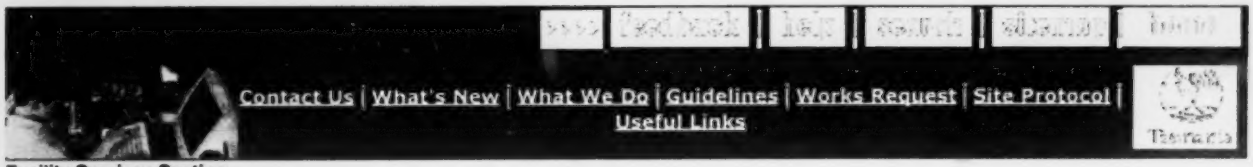

Facility Services Section
Department of Education

Energy Management Plan

4. ENERGY MANAGEMENT PROGRAM

The Manager of the Facility Services Section is responsible for the DoE Energy Management Program, while staff from within the Facility Services Section and selected Consultants, who are managed by the Co-ordinator (Facility Support), undertake tasks related to the Energy Management Program on a day to day basis.

A member of staff has been selected at each facility to monitor and manage the energy use by that facility on an ongoing basis. This person is not necessarily the manager of the facility, but can be some-one with the knowledge, interest or inclination to undertake such a task.

The energy use and costs on DoE sites are monitored on an ongoing basis and consolidated on a regular basis into a single database. The details and trends derived from this database are consolidated into various documents which then allow statistical and other analyses to be undertaken as required and requisite reports prepared. The facilities which appear with the highest per area or per capita energy use can then be targeted in future audits with a view to reducing energy consumption to a level nearer the mean for that category of building.

Once the energy use data is compiled, the most recent period of energy consumption data for each facility can be compared with previous periods and conclusions made. An important factor to be considered at this stage is the effect of weather on heating energy consumption during the winter period. Where large unexplained discrepancies occur they are investigated in greater detail.

Each audit completed to date includes a list of energy conservation measures action items, and related energy savings and implementation costs. These energy conservation measures fall into one of three general categories being:-

- nil or minimum cost items;
- short simple payback period measures (less than three years); or
- long simple payback period measures (greater than three years).

Nil or minimum cost items which have been identified, or which are identified in future audits, have been, and will be, implemented where practical. A number of the shorter simple payback period measures have been implemented as funds have become available. An outstanding program works in excess of $1.3M has been identified for energy saving measures with short simple payback periods. These measures will be implemented as funds can be allocated to this program. At this stage there is no plan to implement long simple payback period measures because there is little likelihood of funds being made available for this purpose in the short to medium term although this matter will be kept under continual

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review.

Energy Consumption data is updated quarterly which corresponds with the Hydro-Electric Commission billing period. An Annual Report is to be prepared which covers:-

- A description of energy management activities and initiatives undertaken during the preceding year.
- The amount of energy consumed by each facility, the variance from previous years, the year's energy cost and its variance from previous years.
- A description of the current human resource structure which is devoted to energy management and conservation.
- A description of the coming year's projected energy management and conservation activities.
- A summary of energy related educational initiatives and programmes which had been conducted to increase staff awareness of energy related issues.
- A description of the energy management and conservation projects and initiatives which had been completed or were in hand during the years and a summary of the expected and achieved outcomes.
- Details of actions and planning taken to minimise the amount of energy consumed by planned or completed new facilities and equipment, and whether the envisaged outcomes were being achieved.
- Details regarding the value of the on-costs associated with the energy management program such as the cost of the energy manager's salary, education initiatives, education brochures and stationary.
- A listing of energy conservation and management projects and initiatives which it is planned to take during the coming year.

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Facility Services Section
Department of Education

Energy Management Plan

5. PROJECT DEFINITION AND IMPLEMENTATION

The information gathered from the energy audits and energy monitoring program is cross referenced with the need to undertake other works in DoE facilities so that if there is some work that can have a multiple benefit effect, this additional consideration can be factored into the project approval process. Project Definition Statements are then prepared for all proposed projects which it is planned to undertake in the short to medium term (a sample is shown at Appendix 'B'). These Statements include details of location, a short description of the proposed project, summary reasons for proposing the project, project costs, projected savings, funding source, and proposed timetable.

Following approval by competent authority within DoE, the works are put in hand either by using in-house project managers or engaging external consultants.

The quantum of energy management projects which can be undertaken is linked to the funding which is made available within the Agency budget. During 1997/98 it is proposed to undertake 38 projects with a total estimated construction/installation cost of $1,037,825 to give projected savings of $315,904:00 per annum. These projects are listed at Appendix 'C'. A further 18 projects have been identified with a total estimated value of $298,200 which if implemented are projected to result in an energy saving of $133,750. These further projects are shown at Appendix 'D'.

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6. CURRENT PROGRAM STATUS

The DoE Energy Management Program has been in effect since 1990. In that period the energy consumption across the Agency has been reduced considerably.

The majority of all the Agency's facilities have been the subject on a medium level energy audit which has identified energy saving measures, and for each allocated an estimate of cost to undertake the initiative and the projected savings.

Proposals are in hand to progress the energy audit process by increasing the range of information that is available to works planners and formalising the monitoring of the audit process within facilities. The first is becoming necessary as the more beneficial and easy cost saving measures have already been implemented, and with the need now to push into an energy saving scenario which is more costly to implement when related to the gains to be made, the depth and accuracy of information on which decisions are made must be greater as the margin for error when predicting savings during the planning phase is getting smaller. The monitoring of the energy audit/monitoring process within facilities to date has been on a site specific basis as determined by the perceived need. This generally has been adequate but similarly, with the need to move to the critical energy saving measures, the need is that the process of energy audit and monitoring within facilities becomes more focussed. To this end a draft discussion document (Appendix E) has been prepared and is currently under consideration within DoE.

The energy saving measures which have been identified and have not been adopted are those with longer pay-back periods and which require funding before they can be implemented.

The educational thrusts which have been taken have resulted in a considerable level of awareness by facility managers or their nominated energy officers and a heightened and enlightened attitude of staff across the Agency to energy management and conservation issues and actions.

The Agency has acted to implement here practical, energy saving measures where these have had nil or negligible cost, or those where the simple payback periods have been shortest. This means that those measures which, when adopted, have been able to easily achieve energy savings, have been those that have been implemented. This means that in future it will be increasingly more expensive to achieve savings from reduced energy consumption, with the potential savings from a given amount of expenditure being progressively reduced.

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Energy Management Plan

APPENDIX A

Extract from Asset Management Plan for Real Property Assets

"3.2.13 ENERGY MANAGEMENT

Expenditure on energy costs the Agency in excess of $8m per annum. Savings can be achieved by either adopting better management practices through education (for example, encouragement to switch off lights and ensuring time switches are correctly set) or by providing capital to install systems that automatically reduce energy consumption, or allow better control by occupants such as better switching arrangements. Effective management of tariffs can achieve significant savings at a site either through taking advantage of tariffs by automatic process in maximum demand systems, or by undertaking accounting processes to determine the most appropriate tariff.

The Agency has been proactive and innovative in energy management. For example the Integrated Energy Management Centre (IEMC), in partnership with the Department of Education, won the 1993 National Energy Management Award for Government.

The Agency had used the IEMC to undertake energy audits in schools, and to undertake energy management training at all of its sites. IEMC had also been contracted to analyse building briefs to ensure good energy management practice is built into new or rehabilitated buildings. The Centre has developed an energy use database at the request of the Agency which, among other things, indicates the sites at which priority action is needed to reduce energy use.

In addition, the Agency has used the services of companies such as Honeywell to install energy management systems in larger sites. With so much energy management work to be undertaken, the position has been adopted that only capital work will be funded where it can be guaranteed that the cost of the installation can be recouped over three years or less, with priority to a one or two year payback period. The IEMC had reported that the outcome so far has been a saving of $2.7m since the inception of the program.

Strategy 15: To continue to pursue energy management options including the installation of systems that guarantee real savings in the short term. To continue to use the services of professional energy management consultants to educate staff and audit sites in relation to energy use. To use the services of energy management professionals to contribute to the design of new and rehabilitated buildings to ensure that the best energy conservation practices are

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applied."

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APPENDIX B

DEPARTMENT OF EDUCATION

Project Definition Statement
Energy Management

1. **SITE/TITLE OF PROJECT**

2. **DESCRIPTION OF PROJECT:**

3. **REASON FOR PROJECT:**
(Including relationship to Government policy and alternatives considered)

4. **ANNUAL SAVINGS IN ENERGY COSTS:** **PAYBACK PERIOD:** Years

5. **PROJECT PRIORITY/FINANCIAL YEAR:**

6. **INDICATIVE COST ESTIMATE:**

   - Indicative cost estimate:
   - Author of estimate:

7. **TOTAL PROJECT COST:**

   - Other Costs:

8. **PROJECT TIMETABLE:**

   - Planned commencement date:
   - Planned completion date:

9. **FUNDING:**

   - Proposed source of funds:
   - Possible alternative funding contributions:

Recommended	**Date**	**Approved**	**Date**

APPENDIX C

DEPARTMENT OF EDUCATION

Energy Management Program
1997/98

The sites on the following pages have been identified for listing on the energy management program for 1997/98.

Sites Listed Alphabetically:

School/College	Est. Expenditure $	Est. Savings $	Payback Period Years
Bridgewater High	84,000	29,150	2.8
Bridgewater Primary	10,700	5,300	2.02
Campania High	7,650	4,500	1.70
Elizabeth College	24,000	10,000	2.40
Glenora High	88,200	22,800	3.87
Hagley Farm Primary	11,800	8,400	1.40
Huonville High	18,800	8,500	2.21
Huonville Primary	9,200	4,400	2.09
Kings Meadow Primary	6,400	5,100	1.25
Kingston Primary	15,400	6,100	2.52
Lauderdale Primary	11,800	5,100	2.31
Launceston College	252,000	98,600	2.55
Miandetta Primary	8,900	3,900	2.30
Murray High	51,300	22,300	2.30
New Norfolk High	8,500	5,000	1.70
New Town High	10,500	4,500	2.33
Nixon Street Primary	2,500	1,800	1.40
Oatlands High	9,800	5,300	1.85
Parklands High	3,000	3,000	1.00
Penguin High	62,800	21,400	2.92
Riverside High	8,300	4,100	2.02
Rocherlea Primary	8,200	4,100	2.00
Rokeby High	11,100	8,400	1.32
Rose Bay High	69,400	22,600	3.07
Sheffield High	109,000	27,000	4.00
Scottsdale high	11,900	5,100	2.33
Somerset Primary	4,100	2,000	2.00
Springfield Gardens	4,500	5,400	0.83
St Georges/Elphin	8,900	6,200	1.44
St Helens High	10,500	5,100	2.06

Sites Listed Alphabetically (cont):

School/College	Est. Expenditure $	Est. Savings $	Payback Period Years
St Marys High	16,800	8,600	1.95
Summerdale Primary	10,000	7,700	1.24
Talire Special School	7,800	4,000	1.95
Taroona High	10,100	7,700	1.31
Triabunna High	2,400	7,450	0.32
Warrane Primary	3,000	4,600	0.65
West Ulverstone	3,000	1,500	2.00
Woodbridge High	7,500	4,000	1.90

Energy Management Program
1997/98

Sites in Order of Payback Time:

School/College	Est. Expenditure $	Est. Savings $	Payback Period Years
Triabunna High	2,400	7,450	0.32
Warrane Primary	3,000	4,600	0.65
Springfield Gardens	4,500	5,400	0.83
Parklands High	3,000	3,000	1.00
Summerdale Primary	10,000	7,700	1.24
Kings Meadow Primary	6,400	5,100	1.25
Taroona High	10,100	7,700	1.31
Rokeby High	11,100	8,400	1.32
Hagley Farm Primary	11,800	8,400	1.40
Nixon Street Primary	2,500	1,800	1.40
St Georges/Elphin	8,900	6,200	1.44
Campania High	7,650	4,500	1.70
New Norfolk High	8,500	5,000	1.70
Oatlands High	9,800	5,300	1.85
Woodbridge High	7,500	4,000	1.90
St Marys High	16,800	8,600	1.95
Talire Special School	7,800	4,000	1.95
Rocherlea Primary	8,200	4,100	2.00
Somerset Primary	4,100	2,000	2.00
West Ulverstone	3,000	1,500	2.00
Bridgewater Primary	10,700	5,300	2.02
Riverside High	8,300	4,100	2.02
St Helens High	10,500	5,100	2.06
Huonville Primary	9,200	4,400	2.09
Huonville High	18,800	8,500	2.21
Miandetta Primary	8,900	3,900	2.30
Murray High	51,300	22,300	2.30
Lauderdale Pri	11,800	5,100	2.31
New Town High	10,500	4,500	2.33
Scottsdale High	11,900	5,100	2.33
Elizabeth College	24,000	10,000	2.40
Kingston Primary	15,400	6,100	2.52
Launceston College	252,000	98,600	2.55
Bridgewater High	84,000	29,150	2.80
Penguin High	62,800	21,400	2.92
Rose Bay High	69,400	22,600	3.07
Glenora High	88,200	22,800	3.87
Sheffield High	109,000	27,000	4.00

APPENDIX D

DEPARTMENT OF EDUCATION

Energy Management Program
1997/98

Alternative Sites

Many of the sites listed here have been included on previous programs, but the work was never implemented, due to lack of funds. For this reason they have been included in this list, which should form the backbone of sites to be upgraded under next years program.

School/College	Est. Expend. $	Est. Savings $	Payback years	Energy Savings %
Brooks High School	14,000	10,300	1.26	13
Burnie Primary School	8,600	4,500	1.90	15
Claremont High	13,300	6,800	1.95	20
Clarence High	41,600	20,400	2.04	
Cressy High	22,400	6,800	3.29	
Deloraine Primary	18,600	7,200	2.60	28
Dunalley High	3,600	3,300	1.09	36
Edith Creek	1,350	1,300	1.04	
Gagebrook Primary	5,250	2,900	1.80	11
Latrobe High	25,150	4,700	5.35	
Lilydale High	11,400	5,300	2.16	15
Montello Primary	2,000	1,250	1.62	9
Ouse High	77,300	10,900	7.09	
Rosebery High	54,700	11,100	4.93	
Rosetta High	20,900	8,600	2.43	
Sandy Bay Infant	800	2,300	0.35	
Sorell High	12,300	15,400	0.80	24

In Order of Payback Time:

School/College	Est. Expend. $	Est. Savings $	Payback years	Energy Savings %
Sandy Bay Infant	800	2,300	0.35	
Sorell High	12,300	15,400	0.80	24
Edith Creek	1,350	1,300	1.04	
Dunalley High	3,600	3,300	1.09	36
Brooks High School	14,000	10,300	1.26	13
Montello Primary	2,000	1,250	1.62	9
Gagebrook Primary	5,250	2,900	1.80	11
Burnie Primary School	8,600	4,500	1.90	15
Claremont High	13,300	6,800	1.95	20
Clarence High	41,600	20,400	2.04	
Lilydale High	11,400	5,300	2.16	15
Rosetta High	20,900	8,600	2.43	
Deloraine Primary	18,600	7,200	2.60	28
Cressy High	22,400	6,800	3.29	
Rosebery High	54,700	11,100	4.93	
Latrobe High	25,150	4,700	5.35	
Ouse High	77,300	10,900	7.09	

Facility Services Section
Department of Education

Energy Management Plan

APPENDIX E
Draft Energy Audit Discussion Document

PREAMBLE

ENERGY AUDITS

All buildings will be subject to audits to ensure compliance with energy saving strategies previously determined and to ensure compliance with DoE Policy to minimise energy usage. *(There needs to be some basis on which an audit is undertaken or some yardstick established for audit purposes. The basis for this would be an energy minimisation policy.)*

DoE ENERGY USE MINIMISATION POLICY

Energy use in all buildings is to be minimised consistent with the need to continue to provide an adequate service to clients and an acceptable quality working environment that complies with the required occupational health and safety standards.

Lights, heating, computers, and appliances generally are to be switched off at the end off the working day and where possible during extended periods of non-use during the working day.

Heating controls are to be set to maintain a temperature no greater than 22°.

Cooling controls are to be set to maintain a temperature of no less than 25°.

Where heating start-up optimisation or outdoor compensation is installed then the start time should be such as to achieve the required space temperature 30 minutes after the occupancy time with a latest start at the time of occupancy.

Facilities would be allocated a target energy usage. Funding allocations would be based on the target energy usage figure. Target energy usage will determined from historical records and auditing of energy usage scenarios at a facility so that the costs of wasteful practices are not included in any facility's target energy usage. To do this, basic data for facilities needs to be obtained which is in greater detail than is available at present.

BASE DATA DETERMINATION

A directory of all fixed and regularly used equipment and appliances (excluding heating) for each space in the building will be compiled and recorded on database. This database will include defined information.

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A directory of all heating equipment will be compiled and recorded on database and will contain defined information. *(The reason for having a separate directory for heating is that there are many systems which service rooms, but are located in remote plant rooms so it is impractical to apportion the heating energy between spaces as listed in the equipment directory. These systems invariably have a variable energy input rate which could cause confusion if included on the equipment directory which has essentially included items with a fixed energy consumption rate. Also there is many instances where the energy source is not electricity so this could also cause some confusion if included in a directory which was otherwise of electrical equipment.)*

Measure the building demand profile and relate this to the energy used for different functions within the building.

Ascertain in association with the building demand profile, or profiles of various individual buildings on a site, exactly where the energy is consumed and when. This will allow the accurate assessment of potential savings.

Actions that can be taken to reduce energy consumption can then be identified. Where these actions can be implemented in-house at no cost then the target energy usage would be reduced by an appropriate amount. Where expenditure of funds are required to implement energy saving strategies then:-

i. if the facility manager uses his own funds to implement energy saving strategies then the savings which result will then be made available to the facility in accordance with any funding initiative which may be in place at that time.
ii. if expended by a central budget centre, then the target energy usage for the facility will be reduced, and an amount equal to the energy savings would be made available to that central budget centre for use in funding further energy management initiatives.

PROPOSAL FOR ENERGY AUDITS

GENERAL

It is imperative that all DoE facilities take all possible action to minimise the amount of energy consumed for heating and general light and power. Energy audits would be undertaken and used to determine a target energy usage for each facility, which would be relative for all facilities, and which would then be used to determine the relevant amount of funds made available to facilities for energy. So that those facilities which have made have made efforts to reduce energy consumption are not penalised relative to those

facilities which have not, the audits will also ensure that energy is not being wasted. Facilities which are found to be wasting energy would have their target energy usage, and hence their funding, reduced accordingly.

The audit will be divided into two parts. The first will be to investigate the procedures relating to the use of energy on the site and the other is to determine the functional uses of energy on the site.

The procedural uses of energy are essentially related to those actions which have a zero cost component and if properly implemented would minimise the use of energy on the facility.

This includes such things as:-

- lights, appliances and equipment being switched off when not in use,
- time clocks being set to give minimum operating times and to not allow items to operate when the facility is unoccupied,
- doors and windows being left open so that heat is lost,
- central heating or cooling plant operating correctly,
- whether the appropriate electrical supply tariff is being used.

The audit relating to the functional uses of energy on the facility will basically determine where the energy is used, how much, and when. From this data it can be determined whether the amount of energy used for any purpose is reasonable, and any actions and related costs which can be taken to reduce the energy used.

PREREQUISITES TO ENERGY AUDITS

Energy Management Guide: Facilities should have a facility specific energy management handbook or guide which advises staff on the procedures which it is expected they will follow so as to minimise the use of energy. The guide should reflect the DoE Energy Use minimisation Policy.

Directory of Appliances and Equipment: Each facility should have a directory of all fixed and regularly used appliances and equipment. If one has not been prepared then it will be necessary to do so. If one exists, then it should be checked to ensure that the information that it contains is current.

Directory of Heating Equipment: Each facility should have a directory of heating equipment and as for the directory of appliances and equipment, it should be checked to ensure the information it contains is current.

Demand Profile: The electricity used by the different parts of a facility, and the different functions within each, needs to be accurately measured and assessed. As part of this is the determination of the facility electrical demand profile taken over a period of time, preferably during the winter heating season.

Direct Measurement of Energy Use: It will also be necessary to record energy use over time or as spot readings so as to ascertain trends in energy use and to derive an understanding (particularly) of the relationship between the weather and the energy required for heating.

AUDITS

Two levels of audit are envisaged:-

Primary - ensure that level 2 audits are being carried out and undertake tasks requiring specialist expertise or equipment.

Level 2 - those items that can be regularly checked by building staff, who do not need to have specialist training or require specialist equipment.

Primary audits will encompass:-

- Checking to ensure that Level 2 audits have been properly undertaken by staff from the site. (Not possible prior to the Primary Audit)
- Undertake the measurement of the electricity demand profile and any other measurement deemed necessary so as to accurately determine the distribution of usage of energy use over the site.
- Identification of procedures which can be taken to reduce energy consumption on the site.
- Evaluation of the possible unnecessary use of energy in situations where sites are underpopulated, but a larger than necessary percentage of the site is being occupied.
- Recommending works that can be undertaken which will reduce energy consumption on the site and the savings and capital costs associated with these works.
- An assessment of the electricity tariff to ensure the one which applies is the most cost effective one which can be used.
- Checking the assessed capacity which is used for billing purposes if electricity is being billed under tariff 36.

Level 2 audits (which are essentially self audits) **will encompass:-**

- Maintaining a directory of all fixed and regularly used electrical equipment and appliances (excluding heating).
- Maintaining a directory of all heating equipment with specialist expertise assistance if needed.
- Maintaining a schedule of plant and equipment operating times.
- Verify that time clocks and other devices which turn appliances, plant and equipment on and off, function as required.
- Keep a record of energy consumption on at least a weekly basis.
- Ensure all control devices function correctly and give the required controlled condition.

AUDIT REPORT

An Audit Report will be prepared which will contain the following information:-

- A copy of the directory of equipment.
- A copy of the heating equipment directory.
- Information relating to the site's electrical demand profile and other information which has been obtained.
- A schedule of nil or minimum cost actions which can be taken to reduce energy consumption.
- A schedule of works which can be undertaken to reduce energy consumption.
- A recommendation whether the existing index is appropriate or should or could be reduced.

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education home

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